1   I CLAIM:

2   1.   A method for determining a polygonal intersection of a first polygon and a

3   second polygon comprising:

4   at an intersection of a boundary of the first polygon with a boundary of the second

5   polygon, determining a first known portion of a boundary of the polygonal intersection as

6   comprised of a portion of the boundary of the first polygon that is located inside the

7   second polygon; and

8   determining each subsequent portion of the boundary of the polygonal

9   intersection that connects to a current known portion of the boundary of the polygonal

10   intersection by selecting that portion of the boundary either the first polygon or the

11   second polygon that connects to a leading end of the current known portion of the

12   boundary of the polygonal intersection and that forms a minimum rotation angle

13   therewith.

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15   2.   The method of Claim 1 wherein the first polygon, the second polygon and

16   the polygonal intersection are represented by data indicating a list of edges.

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18   3.   The method of Claim 2 wherein the edges represent the boundaries of the

19   polygons.

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21   4.   The method of Claim 2 wherein the edges in the list of edges are

22   consistently ordered in either a clockwise or counterclockwise direction.

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24   5.   The method of Claim 2 wherein a hole located in the first polygon is

25   represented by data indicating a list of edges.

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27   6.   The method of Claim 5 wherein the edges in the list of edges that

28   represent a hole are ordered in an opposite direction to the direction used to order the

29   edges in the list of edges used to represent the first polygon.

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1   7.   The method of Claim 2 wherein the edges in the list of edges are

2   consistently ordered in a clockwise direction.

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4   8.   The method of Claim 1 wherein the first polygon and the second polygon

5   represent two-dimensional geographic features.

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7   9.   The method of Claim 1 wherein the steps of determining are performed by

8   a software program that uses a geographic database containing data representations of the

9   first polygon and the second polygon.

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11   10.   The method of Claim 1 wherein the portion of the boundary of the first

12   polygon that is located inside the second polygon is determined by comparing an angle

13   formed by the portion of the boundary of the first polygon with portions of the boundary

14   of the second polygon formed by the intersection.

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16   11.   The method of Claim 1 wherein the intersection of the boundary of the

17   first polygon with the boundary of the second polygon is found by searching a

18   rectangular area formed by an intersection of a first minimum bounding rectangle

19   encompassing the first polygon and a second minimum bounding rectangle encompassing

20   the second polygon.

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22   12.   The method of Claim 1 further comprising:

23   determining an additional polygonal intersection of the first polygon and the

24   second polygon by performing the determining steps for any additional intersection of the

25   boundary of the first polygon with the boundary of the second polygon which is not

26   already part of the polygonal intersection of a first polygon and a second polygon already

27   determined.

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29   13.   The method of Claim 1 wherein the steps of determining are performed on

30   a server connected to the Internet and that provides navigation-related services to users.

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2   14.   A program for determining a polygonal intersection of a first polygon and

3   a second polygon, wherein said program is stored on a computer-readable medium, said

4   program comprising:

5   program code that determines a first known portion of a boundary of the

6   polygonal intersection as being comprised of a portion of a boundary of the first polygon

7   that is located inside the second polygon at an intersection of the boundary of the first

8   polygon with a boundary of the second polygon; and

9   program code that determines each subsequent portion of the boundary of the

10   polygonal intersection that connects to a current known portion of the boundary of the

11   polygonal intersection by selecting that portion of the boundary either the first polygon or

12   the second polygon that connects to a leading end of the current known portion of the

13   boundary of the polygonal intersection and that forms a minimum rotation angle

14   therewith.

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16   15.   The invention of Claim 14 wherein said program is run on a server

17   connected to the Internet that provides navigation-related services to users.

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19   16.   The invention of Claim 14 wherein said polygons represent two

20   dimensional geographic features.

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22   17.   The invention of Claim 14 wherein said polygons are represented by data

23   contained in a database that represents geographic features.

24

25   18.   A method for determining a polygonal intersection of a first polygon and a

26   second polygon represented by data contained in a geographic database,

27   wherein a boundary of the first polygon is represented by a first list of links

28   connected at endpoints thereof and the second polygon is represented by a second list of

29   links connected at endpoints thereof,

30   wherein an endpoint of a link is represented by either a node or a shape point;

1   wherein each location at which the boundary of the first polygon intersects with

2 the boundary of the second polygon is represented by a node;

3   wherein the links contained in the first list of links are in an order corresponding

4 to a consistent direction of traversal of the corresponding links representing the boundary

5 of the first polygon;

6   wherein the links contained in the second list of links are in the order

7 corresponding to the consistent direction of traversal of the corresponding links

8 representing the boundary of the second polygon;

9   the method comprising the steps of:

10   determining a first minimum bounding rectangle that encompasses the first

11 polygon;

12   determining a second minimum bounding rectangle that encompasses the second

13 polygon;

14   determining that the first minimum bounding rectangle and the second minimum

15 bounding rectangle intersect;

16   identifying all the links located entirely in a first polygonal area formed by an

17 intersection of the first minimum bounding rectangle and the second minimum bounding

18 rectangle that have at least one node at an endpoint thereof;

19   associating in a node-link map each node connected to each of the identified links

20 with each of the links connected thereto;

21   identifying a node from the node-link map that has at least three links connected

22 thereto;

23   from the order of two of said at least three links that belong to one of the

24 polygons, determining which one of said at least three links that belong to the other of

25 polygons is located inside the one of said polygons;

26   using the link that is located inside the one of said polygons as a starting link for

27 the polygonal intersection of the first polygon and the second polygon; and

28   determining each other link of the polygonal intersection by selecting from the

29 links that connect to a currently known link at the end thereof according to the consistent

1 direction of travel that link that forms a minimum rotation angle with the currently known

2 link.

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4   19.   The method of Claim 18 wherein the steps of determining, associating,

5 identifying and using are performed by a software program that uses the geographic

6 database.

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8   20.   The method of Claim 18 wherein the steps of determining, associating,

9 identifying and using are performed on a server connected to the Internet and that

10 provides navigation-related services to users.